

Making Sense of

Census 2000



THIS TEACHING GUIDE

will help you to:

- fulfill curriculum requirements
- teach skills that correlate with national standards
- navigate the U.S. Census Bureau Web site
- bring the census to life for your students
- drive home the importance and many benefits of the census

This is Your Future. Don't Leave It Blank.



Scope and Sequence

LESSON

OBJECTIVE

CURRICULUM
CONNECTIONS

SKILLS

STANDARDS*

STRAND 1: MAP LITERACY

1. Size It Up



Students will read and use a U.S. population cartogram.

● Geography

● Reading a Cartogram

● People, Places, and Environment
● Time, Continuity, and Change
● The World in Spatial Terms

2. Make Your Own Map



Students will create a thematic map to compare statistical data.

● Geography
● Math
● Art

● Using Thematic Maps

● People, Places, and Environment
● Individuals, Groups, and Institutions
● The World in Spatial Terms
● Human Systems

STRAND 2: COMMUNITY INVOLVEMENT

3. Future Focus



Students will discuss the importance of the census, then design an advertisement for Census 2000.

● Civics and Government
● Art
● Language Arts

● Thinking Creatively

● Civic Ideals and Practices
● Individuals, Groups, and Institutions

4. District Decisions



Students will learn about reapportionment and redistricting, then debate how congressional districts should be drawn.

● Civics and Government
● Geography

● Thinking Critically

● Power, Authority, and Governance
● Time, Continuity, and Change
● Human Systems
● The Uses of Geography

STRAND 3: MANAGING DATA

5. Samples and Stats



Students will analyze different sampling methods and then design their own surveys.

● Math
● Civics and Government
● Geography

● Understanding Statistics

● Statistics
● Mathematics as Communication
● The World in Spatial Terms
● The Uses of Geography

6. Forecasting the Future



Students will learn about population estimates and population projections.

● Math
● Civics and Government
● Science
● Geography

● Understanding Estimates and Projections

● Algebra
● Time, Continuity, and Change
● Mathematics as Communication
● Human Systems

★ For Grades 9-10

★★ For Grades 11-12

*NCSS Social Studies Standards, NCTM Math Standards and The Geography Education Standards Project Geography Standards

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★ Thinking Creatively
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★★ Thinking Critically



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Additional Resources **Inside Back Cover**

These lessons have been stepped to help you teach and apply this material to the appropriate grade level for your class.

★ For Grades 9-10 ★★ For Grades 11-12

How to Use **This Guide**

The lessons in this guide introduce students to Census 2000 with high-interest, grade-level appropriate activities designed to meet your curricular needs. Students will learn what a census is and why it's important to them, their families, and the community.

Lesson planning at a glance Your Scope and Sequence (on the inside front cover) provides an at-a-glance summary of the lessons in this book. These lessons are divided into three learning strands: *Map Literacy*, *Community Involvement*, and *Managing Data*. The Scope and Sequence identifies skills, objectives, national standards, and curriculum areas for each lesson. This way, you can easily find lessons that support your classroom goals. Map, computer, and library icons allow you to quickly see which lessons interface with the We Count! wall map, and those that offer special enhancements using Internet and library resources.

Customized for your classroom Each lesson in this guide consists of a teacher lesson plan and two reproducible activity pages. Because students in grades 9-12 have attained different degrees of mastery, the lessons in each strand have been stepped (one lesson aimed at grades 9-10; one lesson aimed at grades 11-12), allowing you to tailor your teaching to the individual needs of your students.

Before you begin This teaching guide is based on a unifying concept: *The census is an important part of our democracy*. Before you begin using the lessons, write this concept on the board. Explain that information gathered by the census helps America learn what America needs.

Extension Activities Many lesson plan pages contain one or more Extension Activities designed to enhance students' experience and understanding of the census beyond the classroom. These activities often make use of the vast stores of information available at the official U.S. Census Bureau Web site (see below) and make it possible to incorporate updated Census 2000 information into lessons.

Using the Web site The U.S. Census Bureau Web site (www.census.gov) is easy to use and can provide students and teachers with a wide variety of information on characteristics of the U.S. population. For example: Starting on the home page, click on "Estimates" under the box labeled "People." In this category, choose "States." Students can work with the data found on screen or print it out for easier use. **In addition, teachers can access the lessons from all three Census 2000 Teaching Guides (K-4, 5-8, and 9-12) on the Census Bureau Web site. The Census 2000 questionnaire may also be viewed on this site.**

SYMBOL KEY



We Count!
Wall Map



Internet



Library



For Grades 9-10



For Grades 11-12

**Skills and Objectives:**

- Students will learn how to read and use a cartogram.
- Students will synthesize information from more than one map.
- Students will draw conclusions about population density.

Suggested Groupings:

Individuals, partners

Getting Started:

- Introduce this activity to the class by letting students know that they will compare information gathered from a U.S. population **cartogram** with information gathered from a standard U.S. map. They will use information gleaned from both maps to draw conclusions about state population density.
- Invite students to share their prior knowledge of the census. Then discuss the idea that the U.S. Census Bureau's primary obligation, as directed by the Constitution, is to provide population totals, by state, every ten years. Data from the census are used to **apportion** seats in the House of Representatives and to redraw voting districts within states. The data are useful for a variety of other purposes, such as mapmaking. For example, the mapmaker who created the cartogram used census population data to calculate each state's size. In fact, both the cartogram and the We Count! wall map represent information that would not be available without the census.

Using the Activity Worksheets:

- Distribute copies of worksheet pages 4 and 5 to students. Introduce both the We Count! wall map (including the inset map) and the maps on page 5. Have a volunteer read the text on page 4 aloud. Discuss the fact that both the We Count! wall maps and the cartogram show population and population density information. The type of information shown differs, however. The We Count! maps show numerical population data. The cartogram does not. Instead, it shows a state's population in relation to other states. The states on the cartogram are drawn in mathematical proportion to their populations.
- Ask students whether the We Count! Population Density inset map or the cartogram would better answer this question: **Which state is more densely populated, Georgia or South**

Dakota? (The We Count! Population Density inset map should be used to answer this question correctly. However, by using both the cartogram and the Population Density map, the answer could also be found.)

- Have students answer these questions: **How does Florida look on the cartogram? Is it bigger or smaller than on the regular map? Is it bigger or smaller than other states? (Florida is larger relative to the other states on the cartogram than it is on the standard map.)** Then, have students answer the questions on worksheet page 4.

Wrapping Up:

- Review student answers to questions 1-5 and 8 on the handout.
- Ask students which states they identified as densely populated or sparsely populated in questions 6-7. Have them explain the reasoning behind their choices.
- Discuss situations in which a cartogram might be useful, and situations in which a cartogram would be less useful than a standard map.

Extension Activity: Have students review updated population data from the U.S. Census Bureau Web site (www.census.gov). Under the box labeled "People" choose "Estimates," and then select "State Population Estimates." Based on this data: **Which states might now appear larger on the cartogram? Which might now appear smaller?**

Answers:

Page 4: 1. California. 2. Pennsylvania; because it's larger on the cartogram. 3. New York, Illinois, Kansas, South Dakota. 4. Answers will vary. 5. Answers will vary. 6. Possible answers: Massachusetts, Connecticut, New Jersey. 7. Answers will vary. 8. California, New York, Texas.

Chalkboard Definitions

cartogram: a diagram in map form.

relative: compared with others.

proportional: sized in relation to something else.

apportion: to make a proportionate division or distribution.





Size It Up

● Standard maps of the United States make it easy to compare the **relative** land area of each state. Using these maps, it's clear that Montana is much larger than Connecticut. These maps don't tell you anything about population, however. To find that information, you need to look at a special purpose map that uses census data.

The We Count! wall map is one example. It uses color and numbers to show population data from the 1990 Census while maintaining geographical accuracy.

The **cartogram** at the top of the next page is another kind of special purpose map. In a cartogram, the size of each state is not related to the size of the land area. The mapmaker isn't concerned with the accuracy of boundaries or land areas, but does preserve the shapes and positions of geographic locations. This cartogram was specially drawn so that the size of each state is **proportional** to the number of people who live there. At a glance, you can easily see the relative size of each state's population.

Montana, due to its small population, is shown much smaller than it appears on a standard map. The small state of Connecticut looks much larger. Texas, which has both a large land area and a large population, is shown more or less the same size as it would be on a standard map. Using the cartogram and the standard map, you can draw conclusions about state population density.

● Use the two maps on page 5 (the U.S. Population Cartogram and the Standard U.S. Map) to answer the following questions:

1. Which state has the largest population?

2. Which state has a larger population, West Virginia or Pennsylvania?

How can you tell?

3. Rank these states according to the size of their populations, from highest to lowest: South Dakota, Illinois, New York, Kansas.

1. _____

2. _____

3. _____

4. _____

4. List a state that is much larger on the cartogram than on the regular map.

5. Find your own state on the cartogram. Does it appear smaller or larger relative to its size on the standard map?

6. Find a densely populated state by comparing the cartogram to the standard U.S. map.

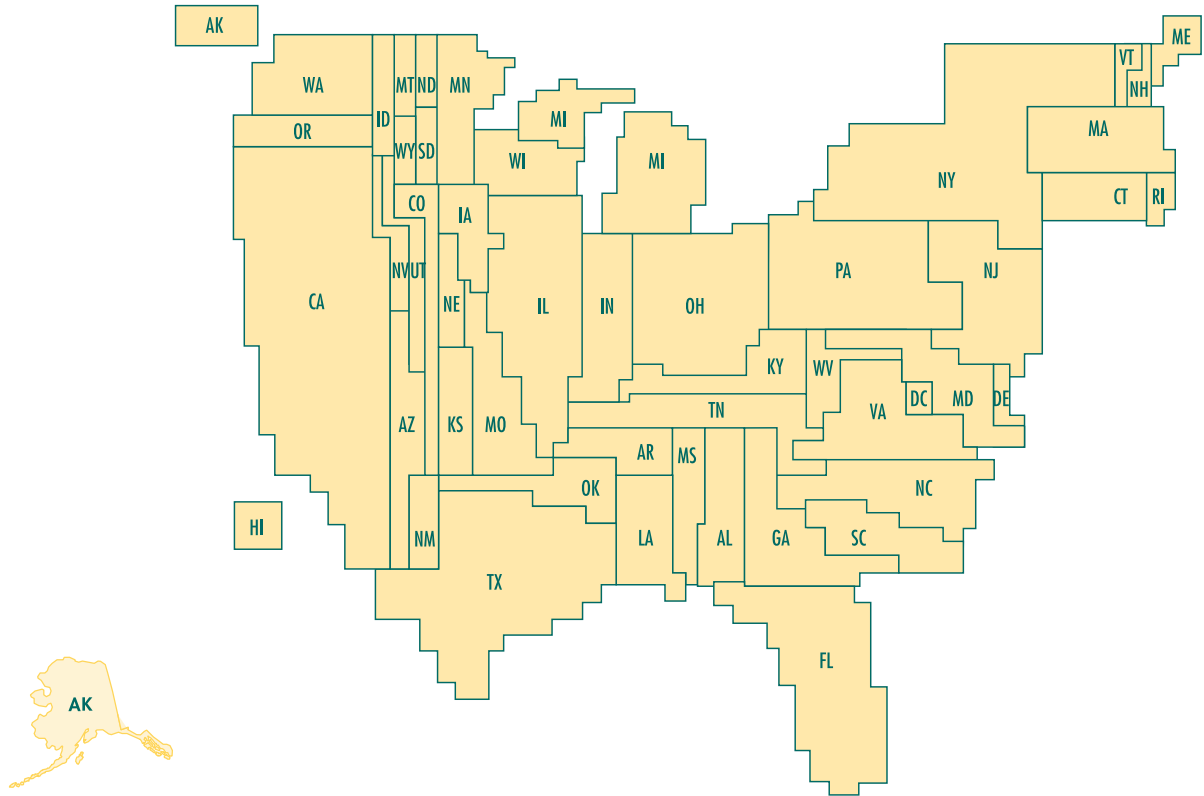
7. Name a sparsely populated state other than Montana.

8. Based on the cartogram, which three states would you conclude have the most U.S. representatives?

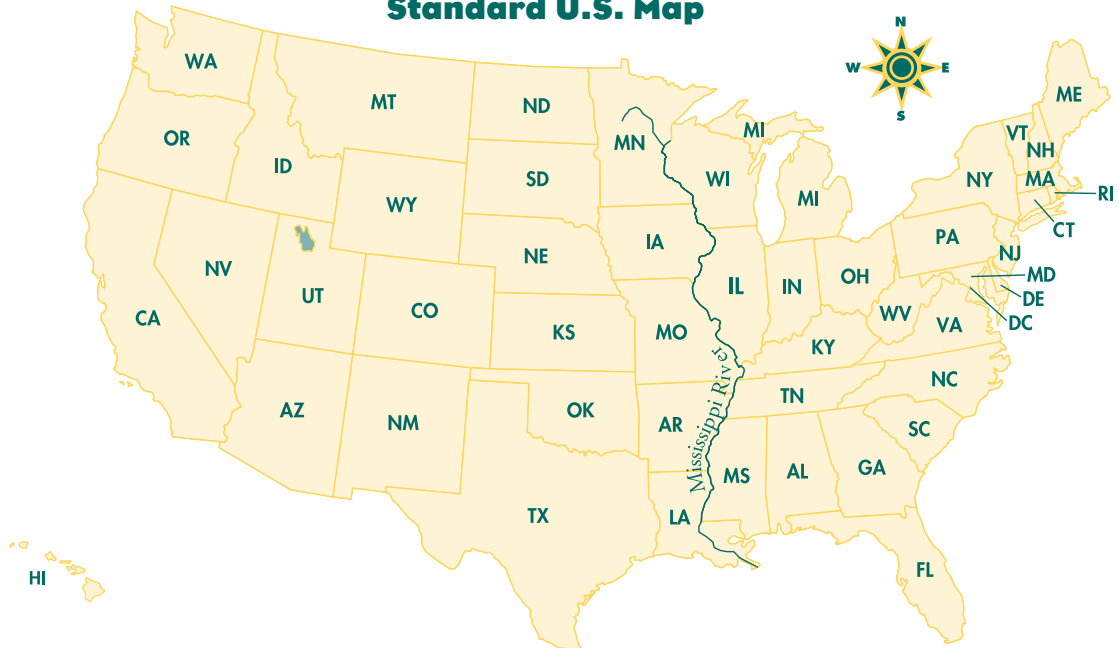


Size It Up (continued)

U.S. Population Cartogram



Standard U.S. Map



Source: U.S. Census Bureau

MAKE YOUR OWN MAP

Map Literacy

★★ Grades 11-12



Skills and Objectives:

- Students will read and use a thematic map.
- Students will make their own thematic map using census data.
- Students will compare data in two statistical categories.

Suggested Groupings: Small groups

Getting Started:

- Tell students that their group will be working with the table of census data on page 7 to make their own **thematic map**. They can use the We Count! wall map as a guide, or for inspiration.
- Direct students' attention to the We Count! wall map. Discuss the map's legend, or key, which explains what the symbols and colors on the map represent. Use examples from an atlas to illustrate other techniques cartographers use to show data on a map, such as patterns and **pictographs**.

Using the Activity Worksheets:

- Distribute copies of pages 7 and 8 to groups. Direct students' attention to the table on page 7. Ask a volunteer to read the text and explain what types of data this table shows.
- Go over the map-making instructions with students. Make sure they understand that they will be representing both sets of information from the table on one map. Have a volunteer explain the two ways in which data is presented on the We Count! wall map. (With color and numbers.) Ask: **Does either table present its data in ranges?** (*No.*) **What must be done with one of these sets of data to be able to color-code it?** (*It must be divided into ranges.*) **Can both sets of data be color-coded on the same map?** (*No.*)
- Point out that the We Count! wall map is only one way in which two types of data can be presented on the same map. Invite students to suggest other ways to present two types of data. These might include using both colors and patterns, or patterns and symbols, that represent ranges.
- Encourage groups to make a draft of their maps before completing their final version. Suggest they assess their drafts to decide if they have chosen the clearest way to present both sets of data. You may want to give each group

several copies of the map on page 8 to work with.

Wrapping Up:

- Have groups share their final maps with their classmates. Discuss the techniques each group used to represent the data in the table.
- Invite volunteers to discuss whether seeing two kinds of data on one map was useful. **How do the two sets of data compare? Do states with the highest percentages of college graduates tend to have higher per capita incomes than others? What generalizations can you make?**

- Point out that correlating two forms of data does not prove that they are related, nor does it explain what causal relationship (if any) there might be. Other factors might be at work. However, if two sets of data do seem related, it is fair to ask the question "Why?" **Do you think people with college educations are more likely to get higher-paying jobs? Could it be more difficult for some people to afford a college education?** Explain.

Extension Activities:

- As an extension, students might enjoy selecting two other categories of information available from the U.S. Census Bureau and making their own maps to display the data. They can look for data at the U.S. Census Bureau Web site (www.census.gov).

Chalkboard Definitions

thematic map: a map that displays information about a specific subject.

per capita: by or for each person in a population.

per capita income: the total number of dollars earned by state residents divided by the total state population.

pictograph: a diagram representing statistical data using symbols.





Make Your Own Map

The We Count! wall map in your classroom is a thematic map. This map is designed to show state populations based on 1990 Census data. In addition to the state population totals, the states are color-coded according to population ranges. This color-coding makes relationships between state populations easier to see. For example, what does the color-coding tell you about the Northeast? The South? The Midwest? The West?

Below, you will find some census information about each state. The percent of college graduates includes those 25 and older who have a bachelor's degree. Per capita income is the total amount of income earned by everyone in the state, divided by the state population.

Your job is to make a map that shows both sets of data from this table. Follow the steps below.

1. Decide how you want to represent the data sets. Remember, you are putting the data on a map to create a visual message. If you just write the corresponding numbers from the table in each state, are you making good use of the map? Will the reader be able to see the patterns in the map?
2. How can you use colors, patterns, or symbols to represent the data sets? You will need to divide the data into ranges. To do this, arrange each set from least to greatest, and divide it according to the number of ranges you would like to use. Make sure each range or category contains data. Then, color the map.
3. Once you have represented the data on your map, fill in the map key. Include the ranges for the colors, patterns and/or symbols you have used.

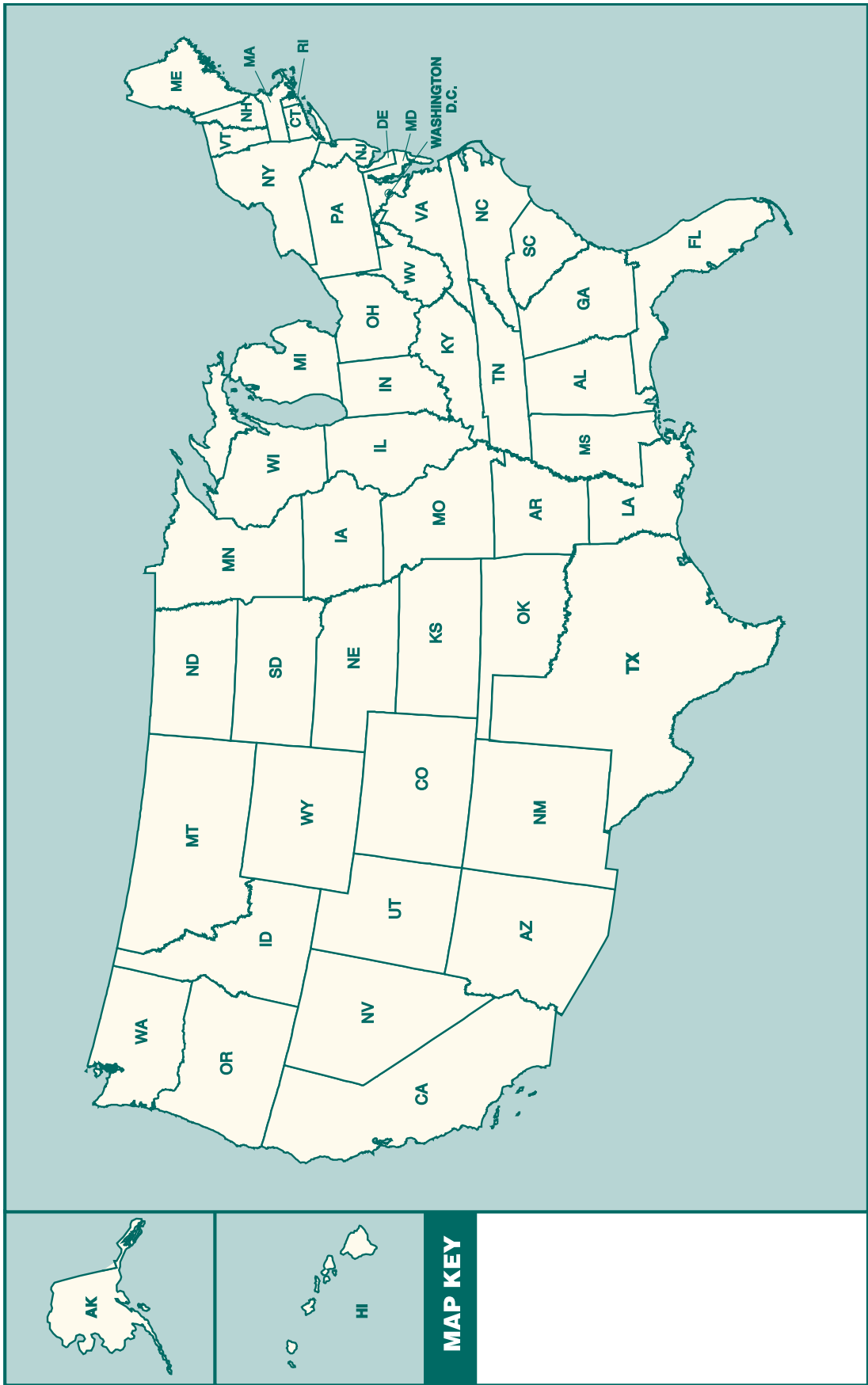
State	% of College Graduates	Per Capita Income
Alabama	16%	\$11,486
Alaska	23%	\$17,610
Arizona	20%	\$13,461
Arkansas	13%	\$10,520
California	23%	\$16,409
Colorado	27%	\$14,821
Connecticut	27%	\$20,189
Delaware	21%	\$15,854
D.C.	33%	\$18,881
Florida	18%	\$14,698
Georgia	19%	\$13,631
Hawaii	23%	\$15,770
Idaho	18%	\$11,457
Illinois	21%	\$15,201
Indiana	16%	\$13,149
Iowa	17%	\$12,422
Kansas	21%	\$13,330
Kentucky	14%	\$11,153
Louisiana	16%	\$10,635
Maine	19%	\$12,957
Maryland	27%	\$17,730
Massachusetts	27%	\$17,224
Michigan	17%	\$14,154
Minnesota	22%	\$14,389
Mississippi	15%	\$9,648
Missouri	18%	\$12,989

State	% of College Graduates	Per Capita Income
Montana	20%	\$11,213
Nebraska	19%	\$12,452
Nevada	15%	\$15,214
New Hampshire	24%	\$15,959
New Jersey	25%	\$18,714
New Mexico	20%	\$11,246
New York	23%	\$16,501
North Carolina	17%	\$12,885
North Dakota	18%	\$11,051
Ohio	17%	\$13,461
Oklahoma	18%	\$11,893
Oregon	21%	\$13,418
Pennsylvania	18%	\$14,068
Rhode Island	21%	\$14,981
South Carolina	17%	\$11,897
South Dakota	17%	\$10,661
Tennessee	16%	\$12,255
Texas	20%	\$12,904
Utah	22%	\$11,029
Vermont	24%	\$13,527
Virginia	25%	\$15,713
Washington	23%	\$14,923
West Virginia	12%	\$10,520
Wisconsin	18%	\$13,276
Wyoming	19%	\$12,311



Lesson 2 Activity Worksheet Using Special Purpose Maps (continued)

Lesson 2 Activity Worksheet





FUTURE FOCUS

★ Grades 9-10

Skills and Objectives:

- Students will recognize the importance of the census and the need to advertise this importance.
- Students will identify the potential concerns of different segments of the population.
- Students will design an advertisement for Census 2000.

Suggested Groupings: Small groups

Getting Started:

● Discuss with students the importance of getting involved in their community and helping to increase census awareness. As a way of doing this, students will develop census ads. The goal is to choose a specific segment of the population as their **target audience** and encourage them to return their census forms, thereby helping the Census Bureau achieve an accurate count of the nation's population.

● Explain that conducting a **decennial** census is a tremendous undertaking. When people don't return their forms by mail, the U.S. Census Bureau must hire employees to knock on doors and record the census information — a costly process. In 1990, many of the more than 300,000 temporary census employees were hired specifically to visit households that did not return forms. It can cost six times as much to count each household in this way. One goal of Census 2000 is to increase the percentage of households that return the census form by mail.

● Brainstorm the importance of responding to the census and the ways in which census data affect our nation's future. (*Examples include: apportioning representation in the House of Representatives; allocating money for education, transportation, and other services.*)

Using the Activity Worksheets:

- Distribute copies of pages 10 and 11.
- Divide students into small groups. Have groups read the text and do the first activity on page 10.
- After groups complete the first activity, have volunteers explain how results of the census

might affect the household categories.

● Students can visit the U.S. Census Bureau Web site (www.census.gov) or the library to find more information for their ads.

● Before students begin designing their ads, encourage them to brainstorm examples of other public service campaigns. You might discuss ad campaigns designed to encourage people to register to vote, or to discourage people from drinking and driving.

● You may wish to offer students the opportunity to select the type of ad they want to work on. They might want to do a print ad, a radio ad, or a television ad. A print ad should include visual elements. A radio ad should be written in a formal script. A TV ad should contain a script as well as a storyboard of visuals.

● Have students design their ads.

Wrapping Up:

● Invite students to use their advertisement viewing experience to analyze various ads.

At what target audience are these ads aimed?

How can you tell?

● Have each group present their ads. For each ad, a group spokesperson should explain the segment of the population they targeted and the reasoning they used when designing their ad for that category.

Answers:

Page 10 (Possible answers):

1. C, E, H. 2. C, H. 3. D, F, G.
4. B. 5. G. 6. A, C, D, H.

Chalkboard Definitions

decennial: occurring every 10 years.

target audience: a specific group of people at which an advertisement or other presentation is aimed.





Future Focus



Census data are used to make a wide variety of federal, tribal, state, and local decisions that affect all U.S. residents. The U.S. Census Bureau needs to spread the word about the importance of filling in and returning the Census 2000 form.

The box below shows some examples of how Census 2000 data can affect the future. As with many other things, people's concerns about the future vary according to who they are. Families with school-age children might have very different concerns than the elderly.

Decide which effects of census data (in the box to the right) might most concern the household categories listed below. Then write those letters in the blanks. (Letters may be used more than once.)

Household Categories

1. Households with children under age 5 _____
2. Households with school-age children _____
3. Households with people
age 65 and over _____
4. Households with cars _____
5. Households without cars _____
6. All households _____

Ways Census Data Can Affect the Future

The Census...

- A.** Determines how many representatives each state has in Congress.
- B.** Can affect where new roads will be built.
- C.** Can determine where new schools and libraries are needed.
- D.** Can play a role in locating new hospitals.
- E.** Can play a role in locating new day care centers.
- F.** Can play a role in locating new nursing homes.
- G.** Can affect public transportation.
- H.** Can play a role in locating new parks and recreational centers.

Design an Ad

Now it's time for your group to create a Census 2000 advertisement aimed at a specific segment of the population or target audience (for example: students in grades 9-12; unmarried adults, ages 18 to 30). As you design, you might want to keep the following in mind:

- What will your ad say? What information about the census and the future will be of interest to your target audience? What would be a convincing reason for your targeted audience to participate in the census? How will your target audience affect ad placement? List three places you would want to display your ad.



Future **Focus** (continued)

- Use the space below to sketch an outline of your ad.

Community Involvement DISTRICT DECISIONS



★ ★ Grades 11-12

Skills and Objectives:

- Students will use a timeline to learn about reapportionment and redistricting.
- Students will debate redistricting based on municipal boundaries vs. population counts.

Getting Started:

- Review the legislative branch of our government: the House of Representatives and Senate.

- Introduce the concepts of reapportionment and redistricting, emphasizing these points:

1. The Census Bureau collects population totals; **reapportionment** decisions are made by Congress; **redistricting** decisions are made by state legislators.
2. Before the 1960s, apportionment of state legislature seats was often based on land area not population, so a sparsely populated area could have the same congressional clout as a more densely populated one.
3. Courts today have interpreted the “one person, one vote” principle to mean congressional, state, and local districts must be composed of approximately equal population totals. Redistricting occurs to reflect changes in relative numbers of people living in each state.
4. Population redistribution within states affects redistricting. Redistricting by population can often lead to oddly shaped districts that don’t conform to **municipal** boundaries.
5. After the 1990 Decennial Census, lawsuits were filed challenging several newly drawn congressional districts. The most well-known of these cases involved North Carolina’s 12th District, which was a ribbon-like, 160-mile long district that was drawn, in compliance with the Voting Rights Act, to redress prior discrimination against minorities in North Carolina. Although African-Americans make up nearly 25 percent of North Carolina’s population, an African-American had not been elected to congress from that state in over 100 years.

- A political party with control of a state legislature may try to “gerrymander” district boundaries to favor its party over others. Political **gerrymandering** is not illegal. However, courts have ruled in the North Carolina case that “racial gerrymandering” is illegal.

- Discuss whether gerrymandering in any form should be legal. What factors should be considered in drawing congressional districts?

Chalkboard Definitions

reapportionment: the reassignment of congressional representation based on changes in state populations.

redistricting: drawing new congressional district boundaries.

municipal: relating to a town, city, or urban area.

gerrymandering: redrawing district boundaries to give a political party or other group an electoral advantage.

Using the Activity Worksheets:

- Distribute copies of pages 13 and 14. Review the redistricting timeline with students, then have them research the redistricting process in their state. To assist them in their research, refer students to the Web sites on page 14.

- Have students complete page 13, then review their responses.

- Divide students into four groups. Explain that the groups will debate a proposed change in the way congressional districts are drawn. There will be two duplicate debates. To help

students prepare, have them research and answer the debate prep questions.

- Next, have the groups read the debate statement and choose sides. Explain that, during the debate, each side will be allowed to speak twice for up to 10 minutes, once to present their argument, and once for rebuttal of the other side’s argument. The side in favor of the debate statement will go first and will receive an extra one minute counter-rebuttal at the end.

- Have groups present their debates. Discuss the issue. **Which side receives more support?**

Extension:

- Have students find out more about their own congressional voting district. **Who is their representative?** Students can check the library or visit www.house.gov/writerep.

Answers:

1. Students should note trends: representation (and population) in the Northeast and Midwest have declined since 1960; while representation has increased in the South and West.
2. Answers will vary and might include: a smaller tax base; a strain on natural resources.
3. Answers will vary. Growing regions should insure that issues important to them are debated in Congress.

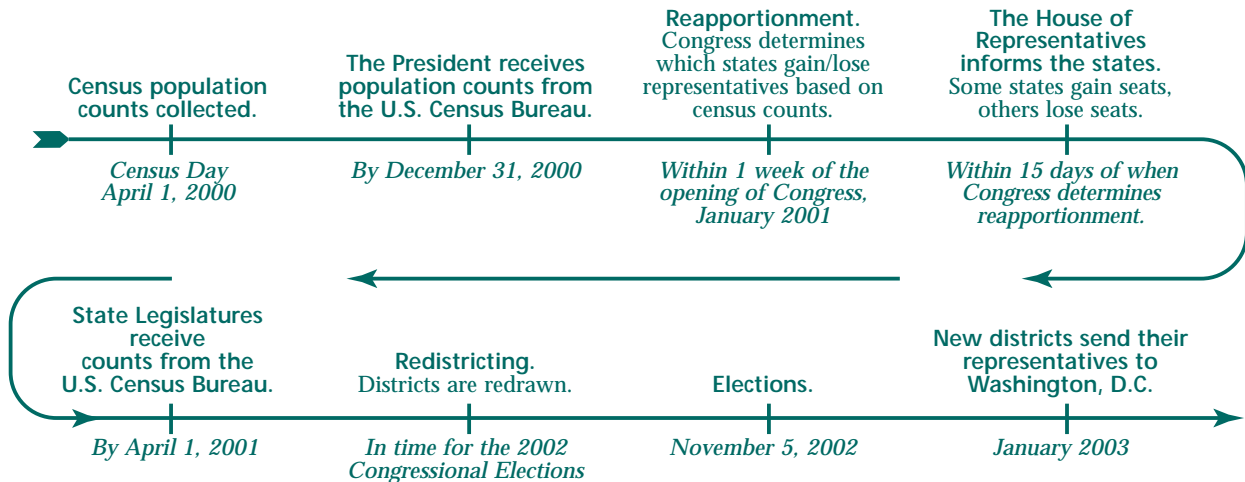




District Decisions

Census population counts play an important role in how we are represented in the House of Representatives. When a state's population changes significantly (compared to the rest of the country), the House of Representatives adds or subtracts a representative from that state. This is called **reapportionment**. When state populations change, the state legislatures use census population counts to draw new district boundaries. This is called **redistricting**. The timeline below shows you how the process works:

Census Redistricting Timeline



Now use this table to answer the questions below.

Congressional Representatives by Region:					
Region		1960	1970	1980	1990
Northeast	CT, MA, ME, NH, NJ, NY, PA, RI, VT	108	104	95	88
South	AL, AR, DC, DE, FL, GA, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, WV	133	134	142	149
Midwest	IA, IL, IN, KS, MI, MN, MO, ND, NE, OH, SD, WI	125	121	113	105
West	AK, AZ, CA, CO, HI, ID, MT, NM, NV, OR, UT, WA, WY	69	76	85	93

- What does this table tell you about changes in the nation's population? Why do you think these changes have taken place? _____
- How have these changes affected these regions? _____
- How do you think shifts in regional population might affect the goals or priorities of the House of Representatives? _____



District **Decisions** (continued)

● Drawing districts so that they have equal populations means that some districts have larger or smaller land areas than others. It also means that these districts can divide or cross **municipal** boundaries. A neighborhood may be part of two or more voting districts! What if federal districts were drawn according to county, city, town, or neighborhood boundaries? How would that affect our representation in Congress? Would it compromise the “one person, one vote” principle upon which our democracy is based? Should voting districts be based on municipal boundaries and not population counts? Read the debate statement below.

Debate Statement: Congressional districts should be based on municipal boundaries, not population counts. Yes or No.

Debate Prep Questions

Conduct research to find the answers to these questions. If necessary, use a separate piece of paper.

1. How many voting districts are there in your state? Do any of them cross municipal boundaries?

2. How often has your state redrawn voting districts over the past 50 years? _____
3. Based on your state's population distribution, would a change to municipal voting districts mean that some representatives represented twice as many people as others? How often might this occur? _____

4. How might your state's districts be redrawn to conform to municipal boundaries? _____

● You may wish to visit these Web sites while preparing for your debate:

<http://www.ncsl.org/statevote98/redis1.htm>
The National Conference of State Legislature's Web site has information on redistricting issues.

www.ncinsider.com//redistrict/redistrict.html
This site provides additional information about redistricting rulings involving North Carolina's 12th district.

<http://www.senate.leg.state.mn.us/departments/scr/redist/red907.htm>

This site, developed by the Senate Counsel to Minnesota, contains information on recent Supreme Court decisions regarding redistricting.

<http://www.ncsl.org/statevote98/statesites.htm>
This site contains district maps for some states.

Tips for Your Debate

1. **Do the research.** Find out all you can about the redistricting process.
2. **Use examples.** Look for specific instances from the past that will support your claim, like court cases.
3. **Get organized.** Create a list of factors that the proposed change would affect. Then create an outline that addresses them.
4. **Be prepared.** The winning side in a debate is usually the one that has done more preparation.



SAMPLES AND STATS

★ Grades 9-10

Skills and Objectives:

- Students will identify different sampling methods.
- Students will design and conduct surveys using sampling methods.

Suggested Groupings:

Partners, small groups

Getting Started:

● Have students share any prior knowledge of **sampling** they may have. Discuss the idea that sampling makes it possible to gather information about a population when surveying every member is impossible or impractical. Educators, advertisers, and policymakers all use information gathered through sampling. The U.S. Census Bureau also develops and uses sampling techniques to gather information about the U.S. population. For example, while the Census Bureau distributes both a short and long census questionnaire, only one in six households will get a long form for Census 2000. This sample is large enough to provide the data to accurately describe the U.S. population.

● Explain to students that this activity will introduce them to a variety of sampling methods and the multiple steps involved in the process of conducting a survey to gather statistical information. Make sure they understand that the sampling process they will use to obtain data is much simpler than the methods used by the U.S. Census Bureau and others.

Using the Activity Worksheets:

● Distribute copies of pages 16 and 17 to students. Have them read and complete the activity on page 16. Alternatively, you may wish to do this activity as a class.

● Then have students read and discuss the section on bias at the top of page 17. Ask: **Can you come up with your own example of a biased sample?** (For example, if you conduct a **survey** of your classmates by e-mail, you will automatically exclude all class members who do not have access to e-mail.) **What steps can researchers take to ensure that the studies they design are not biased?**

● Before students begin, discuss the difference between the type of survey the Census Bureau conducts and a poll. The Census Bureau uses surveys to collect and analyze social, economic, and geographic

data. A **poll** is a survey that is used to measure attitudes and opinions. Go over these steps with them. **1.** Choose a survey question.

Make sure students choose a question that asks for factual information, like age or education level,

rather than an attitude or opinion. **2.** Identify the target population and sample size. **3.** Decide on the sample method. **4.** Conduct the survey and interpret, tabulate, and graph or map results.

- To demonstrate, choose your own question and do a quick survey with your students.

Wrapping Up:

● Have each group present their surveys and results. Ask a spokesperson for each group to discuss the target population, sample size, and sample method used in the survey. Have students share their conclusions.

● Have students conduct further research about the sampling methods presented here. Have the class agree on one survey question. Divide the class into three groups, and have each group use a different sampling method. Be sure each group uses the same size sample. Then invite the groups to compare results. Alternatively, student groups could use the same sampling method on different sample sizes.

● Students can visit the U.S. Census Bureau Web site (www.census.gov) to get information from surveys conducted on such subjects as computer use, crime, education, etc. Click on "Subjects A-Z" and choose "S" then "Surveys."

Answers:

Page 16:

1. Cluster sampling.
2. Random sampling.
3. Systematic sampling.

Chalkboard Definitions

sampling: using a finite part of a statistical population for study, in order to gain information about the whole.

survey: a set of questions asked of a specific population to collect data for analysis.

poll: a survey that measures attitudes and opinions.





Samples and Stats

Sampling is a scientific technique used to obtain as accurate a figure or measurement as possible, when an exact count cannot be taken. By measuring a scientifically selected portion of a population, it is possible to describe the characteristics of the entire population.

Below is a chart describing three different scientific sampling methods. The U.S. Census Bureau's long form is an example of systematic sampling. **For Census 2000, a systematic sampling of approximately 1 in every 6 households will receive the long form, and an average of 5 out of every 6 households will receive the short form.** Although the long form doesn't go to every household, information from these forms can be used to accurately describe the entire U.S. population.

Here are three different sampling methods:

Random Sampling	Cluster Sampling	Systematic Sampling
Each individual in the population has an equal chance of being selected. Example: To take a random sample of students in your school, you could write the name of each student on a slip of paper, then choose slips at random.	Groups, rather than individuals, are randomly selected. Example: You might randomly select certain classes, then interview every student in only those classes.	A rule, or pattern, that applies to a population is used to make selections. Example: Using an alphabetical list of students, count off by 6, and select every 6th student on the list.

Test your understanding of different sampling techniques. Draw lines to match the sampling methods with their types.

- | | |
|--|------------------------|
| 1. Choose any three pages from the telephone book at random, and call everyone on those pages. | a. Random Sampling |
| 2. Choose 100 telephone numbers at random from the entire book. | b. Systematic Sampling |
| 3. Choose every 100th listing in the telephone book. | c. Cluster Sampling |



Samples and **Stats** (continued)

● When choosing a sampling method, you need to beware of hidden biases. For example, imagine that you want to know if teenagers today are taller than teenagers in the past. You've found information about the average height of students in your school in 1940 and 1970. Now you need to find out the average height of students in your school today. You probably don't want to get the height data from a sample consisting of members of the school basketball team! Why not?

● **Design your own sample survey.**

1. Acting as your school's census bureau, identify a characteristic of interest or importance to your school and choose a survey question. (Topic examples: transportation to and from school, team sports or other extracurricular activities, foreign languages studied, etc.) For some of these topics, you may be able to check the accuracy of your survey results against actual tallies your school keeps. Be sure not to ask questions about attitudes or opinions.

Write your topic and survey question here:

2. Choose your target population. The target population is the group of people to whom you want the sample survey to apply. For instance, a survey about a school-related question could apply to the students in your grade or to the whole student body. Make sure you survey a good sample of your target population. (For example, if your survey applies to a student body of 400, you might want to talk to at least 10%, or 40 people.)

Write your target population and sample size here: _____

3. Based upon the steps above, which sampling method would you choose for your survey? Why?

4. Now conduct your sample survey and tabulate the results. Then organize your results into a graph or table and add a narrative summary. Share your graph, or table and summary, with the class.

FORECASTING THE FUTURE

★★ Grades 11-12

Skills and Objectives:

- Students will learn about population estimates and population projections.
- Students will compare population projections based on numerical (arithmetic) growth and on percent (geometric) growth.

Getting Started:

● Introduce the lesson by discussing the following terms that are defined in the lesson as they relate to population: enumerations, estimates, projections, components of population change, births, deaths, and net migration. Help the students understand that information about the U.S. population is important for a variety of purposes, including planning in both the public sector (e.g., where to build schools and hospitals) and the private sector (e.g., store location and marketing), and that population figures are used in determining federal and state fund allocations.

Using the Activity Worksheets:

Distribute copies of pages 19 and 20 to students and discuss the problems with them. Have students individually, or in pairs, calculate the answers to questions 1 through 11. Then with the entire class, discuss answers to questions 12 through 16.

Population estimates and projections:

Discuss with students how U.S. Census Bureau population estimates and projections are actually done, and explain that the methodology used by Census Bureau demographers is more complicated than the hypothetical examples given here. There can be many assumptions and variables involving the set of components (fertility, mortality, and net migration) that contribute to the population growth estimates and projections the U.S. Census Bureau publishes.

For further information on population estimates: www.census.gov/population/www/estimates/concepts.html

For further information on population projections: www.census.gov/population/www/projections/aboutproj.html

Chalkboard Definitions

rate: a standard amount used to calculate a total, as in a percentage change in population over the course of a year.

population estimate: a conclusion about the past or present population based on existing data.

population projection: computation of future changes in population size based on assumptions about births, deaths, and migration.

Answers:

- 32,621,613.
- 254,899 and 8.4 percent.
- 568,996 and 14.9 percent.
- 895,990 and 34.6 percent.
- 1,889,829 and 106.4 percent.
- Answers will vary.
- 3,542,015 and 3,563,234.
- 4,944,095 and 5,026,989.
- 4,382,693 and 4,693,102.
- 5,555,057 and 7,565,031.
- Answers will vary.
- Because the percent increase is applied to a larger population in 1990 than in 1970.
- Arizona. Because Arizona had the highest percent increase in population during the 1970–1990 period, it has the largest proportionate difference between a population projection for the year 2010 based on numerical growth versus percent growth.
- The population projection based on percent change would be larger because the percent decline would be applied to the smaller 1990 population.
- Calculate one-half the numerical growth of the 1970–1990 period and then add it to the 1990 population.
- Calculate the ratio of the 1990 to the 1970 population (to six decimal places to minimize rounding error), then take the square root of the ratio and convert it to a percent increase. Multiply the percent increase by the 1990 population, then add the product to the 1990 population. You can't assume one-half of the percent growth for the 1970–1990 period because of the compounding effect of a geometric rate of increase — an analogy would be compound interest rates. Taking South Carolina as an example, the ratio of its 1990 to its 1970 population is 1.345847. The square root of 1.345847 is 1.160, yielding a 16 percent increase in population in the 1990–2000 decade. The increase of 557,872 added to the 1990 population of 3,486,703 yields a population projection for the year 2000 of 4,044,575.





Forecasting the Future

Enumerations, estimates, and projections of population

The U.S. Census Bureau produces three basic types of information about the U.S. population: **enumerations**, **estimates**, and **projections**. **Enumerations** are counts of the population such as in the 1990 census of population. **Estimates** are calculations of the population for a recent date and are usually based on the last census as well as on information about population change since the last census. **Projections** are calculations of the population for a future date and are usually based on the last census or estimate, and on assumptions about future population growth or decline.

Population Estimates

The three basic **components of population change** between two dates are **births**, **deaths**, and **net migration**. For population estimates for states, net migration may be divided into **net international migration** (immigration to the United States minus emigration from the United States) and **net domestic migration** (in-migration from other states minus out-migration to other states).

For California, the population in 1990 was 29,785,857. For the 1990–1998 period, data on the components of population change show the following:

births (B) = 4,708,894, deaths (D) = 1,810,698, net international migration (NIM) = +2,019,488, and net domestic migration (NDM) = -2,081,928. Calculate the 1998 population estimate for California using the following formula:

$$I. P_{1998} = P_{1990} + B - D + NIM + NDM$$

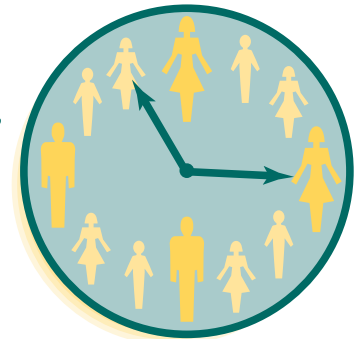
Population Projections

To make population projections for the United States or for individual states, demographers make assumptions about future trends in the components of population change. These assumptions, which reflect professional judgment and take into account past trends, are made in terms of rates for births and deaths, and in terms of rates or numbers for migration.

For simplicity, the population projections discussed below are based on assumptions about past trends in total population, not on assumptions about each component of population change. Table 1 shows the 1970 and 1990 census populations for four states, all with populations that increased between 1970 and 1990. Calculate numerical growth (1990 population minus 1970 population) and percent growth (population growth as a percent of 1970 population, with percent change rounded to one decimal place).

Table 1. Population of Selected States: 1970 and 1990

State	1970	1990	Population growth, 1970–1990	
			Numerical	Percent
2. Connecticut	3,032,217	3,287,116		
3. Minnesota	3,806,103	4,375,099		
4. South Carolina	2,590,713	3,486,703		
5. Arizona	1,775,399	3,665,228		
6. Your State				





Forecasting the **Future** (continued)

Calculate population projections for each state for the year 2010 assuming a continuation of trends for the 1970–1990 period: first based on numerical change (an arithmetic rate of change), then based on percent change (a geometric rate of change) with the results rounded to the nearest integer.

Table 2. Population Projections for Selected States: 2010

State	Based on numerical change	Based on percent change
7. Connecticut		
8. Minnesota		
9. South Carolina		
10. Arizona		
11. Your State		

Questions about population projections

12. Why are the population projections for the year 2010 larger when based on percent change than when based on numerical change for the 1970–1990 period? _____

13. For which of the first four states is the proportionate difference between the two projections the largest and why? _____

14. If the population of a state had declined between 1970 and 1990, which population projection — numerical change or percent change — would be larger for the year 2010 and why?

15. How would you use the data in Table 1 to project population for states for the year 2000 assuming past trends in numerical population change?

16. How would you use the data in Table 1 to project population for states for the year 2000 assuming past trends in percent population change?

Selected Census 2000 Short Form Questions

1. What is this person's sex?

- ☐ Male
- ☐ Female

2. What is this person's age and date of birth? (Print numbers in boxes)

Age on April 1, 2000

Month of Birth

Day of Birth

Year of Birth

Note: Please answer BOTH questions 3 and 4.

3. Is this person Spanish/Hispanic/Latino?

- ☐ No, not Spanish/Hispanic/Latino
- ☐ Yes, Mexican, Mexican American, Chicano
- ☐ Yes, Puerto Rican
- ☐ Yes, Cuban
- ☐ Yes, other Spanish/Hispanic/Latino — Print group below ↴

4. What is this person's race? Mark one or more races to indicate what this person considers himself/herself to be.

- ☐ White
- ☐ Black, African American, or Negro
- ☐ American Indian or Alaska Native — Print name of enrolled or principal tribe below ↴

- ☐ Asian Indian
- ☐ Chinese
- ☐ Filipino
- ☐ Other Asian — Print race below ↴
- ☐ Japanese
- ☐ Korean
- ☐ Vietnamese

- ☐ Native Hawaiian
- ☐ Guamanian or Chamorro
- ☐ Samoan
- ☐ Other Pacific Islander — Print race below ↴

- ☐ Some other race — Print race below ↴

View the Census 2000 questionnaire on the U.S. Census Bureau Web site (www.census.gov).

Additional Resources



Web sites

U.S. Census Bureau (www.census.gov). The source for information on people, business, and geography, this site offers census news, maps, tools to build your own data tables, and more.

Census Catalog and Guide (www.census.gov/prod/3/97pubs/cenat97.pdf). Here's where you can find out about the data products and services available from the U.S. Census Bureau. For more information, call (301) 457-4100.

50 States & Capitals (www.50states.com). Visit here for all kinds of official state information, such as state bird, state song, government representatives, and more.

U.S. House of Representatives (www.house.gov). This site offers up-to-date reports of House events and an opportunity to identify and contact House Representatives.

Map Man (www.scholastic.com/jsi/mapman). This is an on-line geography contest, hosted by *Junior Scholastic* magazine, featuring a new game each week.



Books

State Governments by Barbara Silberdick Feinberg (Watts, 1993). This easy-to-read book explains the division of power between federal and state governments, and gives an overview of what officials, such as governors, legislators, and judges, do.

Take a Stand! by Daniel Weizmann (Price/Stern/Sloan, 1996). An upbeat introduction to American government with a bias toward civic participation, this book uses humor and cartoons to make learning about the branches of government, related agencies, and party politics fun.

Statistical Abstract of the United States by the U.S. Census Bureau (National Technical Information Service, 1998). If one book can sum us up as a nation, it's this hefty one. Order it by phone (1-800-553-6847) or via the Internet (www.census.gov/stat_abstract).



**This is Your Future.
Don't Leave It Blank.**